Applicant(s): Ricky Amos, et al.

Examiner: Matthew C. Landau

Serial No: 09/995,031

Art Unit: 2815

Filed: November 29, 2001

Docket: YOR920010633US1 (19031)

For: HIGH TEMPERATURE PROCESSING COMPATIBLE METAL GATE ELECTRODE FOR pFETs AND METHOD FOR FABRICATION

Confirmation No: 9669

Exhibit A

Disclosure YOR8-2001-0675

Prepared for and/or by an IBM Attorney - IBM Confidential

Required fields are marked with the asterisk (*) and must be filled in to complete the form .

*Title of disclosure (in English)

High Temperature processing compatible metal gate electrode for p-fet's and method for its fabrication

Summary

Status	Final Decision (File)
Final deadline	
Final deadline reason	
Docket family	YOR9-2001-0633
* Processing location	Yorktown
* Functional area	(700) 700 Isaac-Systems, Technology & Science
Attorney/Patent professional	
IDT team	
Submitted date	
* Owning division	RES
Incentive program	
Lab	
* Technology code	
Patent value tool (PVT) score	47

Inventors without a Blue Pages entry

IDT Selection

Main Idea

To view the Main Idea of this disclosure, open the "Main Idea" document from the view

*Critical Questions (Questions 1-9 must be answered in English)

YOR8-2001-0675 High Temperature processing compatible metal gate electrode for p-fet's and method for its fabrication - continue

*Question 1
On what date was the invention workable? Please format the date as MM/DD/YYYY
(Workable means i.e. when you know that your design will solve the problem)

*Question 2
Is there any planned or actual publication or disclosure of your invention to anyone outside IBM? ● Yes ○ No

If yes, Enter the name of each publication or patent and the date published below.

Date Published or Issued: publication planned at some unspecified future time

Are you aware of any publications, products or patents that relate to this invention? ○ Yes ● No

If yes, Enter the name of each publication or patent and the date published below.
Publication/Patent:
Date Published or Issued:

*Question 3
Has the subject matter of the invention or a product incorporating the invention been sold, used internally in manufacturing, announced for sale, or included in a proposal? ○ Yes ● No

Is a sale, use in manufacturing, product announcement, or proposal planned? ○ Yes ● No

If Yes, identify the product if known and indicate the date or planned date of sale, announcements, or proposal and to whom the sale, announcement or proposal has been or will be made.
Product:
Version/Release:
Code Name:
Date:
To Whom:
If more than one, use cut and paste and append as necessary in the field provided.

*Question 4
Was the subject matter of your invention or a product incorporating your invention used in public, e.g., outside IBM or in the presence of non-IBMers? ○ Yes ● No

If yes, give a date. Please format the date as MM/DD/YYYY

*Question 5
Have you ever discussed your invention with others not employed at IBM? ○ Yes ● No

If yes, identify individuals and date discussed. Fill in the text area with the following information, the names of the individuals, the employer, date discussed, under CDA, and CDA #.

*Question 6
Was the invention, in any way, started or developed under a government contract or project? ○ Yes ● No ○ Not sure

If Yes, enter the contract number

*Question 7
Was the invention made in the course of any alliance, joint development or other

contract activities? ○ Yes ● No ○ Not Sure

If Yes, enter the following:

Name of Alliance, Contractor or Joint Developer	
Contract ID number	
Relationship contact name	
Relationship contact E-mail	
Relationship contact phone	

*Question 8
Have you, or any of the other inventors, submitted this same invention disclosure or similar invention disclosure previously? ○ Yes ● No

If Yes, please provide disclosure number below:

*Question 9
Are you, or any of the other inventors, aware of any related inventions disclosures submitted by anyone in IBM previously? ○ Yes ● No

If Yes, please provide the docket or disclosure number or any other identifying information below:

Question 10
What type of companies do you expect to compete with inventions of this type? *Check all that apply.*

- ☐ Manufacturers of enterprise servers
- ☐ Manufacturers of entry servers
- ☐ Manufacturers of workstations
- ☐ Manufacturers of PC's
- ☐ Non-computer manufacturers
- ☐ Developers of operating systems
- ☐ Developers of networking software
- ☐ Developers of application software
- ☐ Integrated solution providers
- ☐ Service providers
- ☐ Other (Please specify below)

Question 11
If the invention relates to a product or service that is outside the scope of your business unit, please recommend IBM business unit(s), IBM location(s) or individual(s) within IBM that you think would provide a good evaluation of your invention:
N/A

*Patent Value Tool (Optional - this may be used by the inventor and attorney to assist with the evaluation

(The Patent Value tool can be used by the inventor(s) to determine the potential licensing value of your invention.)
Market
*Question 1: What is the anticipated annual market size (in dollars) that will be captured by your invention?

$1B to $5B
Reason(s) for above Answer: could become standard method for future CMOS

Claims
*Question 1: How new is the technical field?
Emerging
Reason(s) for above Answer: metal gates are not currently in use with CMOS, but planning for thier incorporation is active.

*Question 2: How central is the invention to the product(s) which might be expected to contain the invention?
Essential
Reason(s) for above Answer: a suitable gate electrode for pFET's is esential for functioning CMOS technology

*Question 3: What is the scope of the claim?
Broad
Reason(s) for above Answer:

Portfolio Need
*Question 1: What are the portfolio needs in the area of your invention?
Listed in PPM Needs
Reason(s) for above Answer: pertains to advanced CMOS devices, PPM 100, A2

Exploitation & Enforcement
*Question 1: How easily can the use of the invention by a competitor be detected?
With work
Reason(s) for above Answer: straight forward sims or equivalent chemical analysis will reveal the presence of Re

*Question 2: How easily can the use of the invention be avoided by a competitor?
With much work
Reason(s) for above Answer: entirely new, low temperature processing schemes might have to be developed

Business Value
*Question 1: What percentage of the companies producing products in the field of this invention might use this invention?
Broadly cloned
Reason(s) for above Answer: it could become the standard form of CMOS, equivalent to the poly gates of today

*Question 2: What is the value of this patent to current or anticipated Alliance Activity between IBM and other companies?
Some value
Reason(s) for above Answer: not really known

*Question 3: What is the value of this patent to current or anticipated Technology Transfer Activity between IBM and other companies?
High value
Reason(s) for above Answer:

*Question 4: Does it result in prestige to IBM?
Industry wide
Reason(s) for above Answer: if it becomes the industry standard

YOR8-2001-0675 High Temperature p[illegible]essing compatible metal gate electrode for p-fet's a[illegible] method for its fabrication - continue

Final Decision

This decision was entered by :

Decision: File Status: N/A

PPM area:

Date of final decision :

Additional filing information
Planned Filing date:
Filing comments:

Additional decision comments

Final Decison History

Post Disclosure Text & Drawings

To add additional information related to this disclosure once it has been submitted, click the action button below and a new document will be opened for you to enter the new information. To view existing post disclosure information, double-click on the item in the list below (if there has been additional information entered), and the document will open for you to view.

Date entered	Post disclosure comments and drawings (double-click an item below to view)

Main Idea for Disclosure YOR8-2001-0675

Prepared for and/or by an IBM Attorney - IBM Confidential

Title of disclosure (in English)
High Temperature processing compatible metal gate electrode for p-fet's and method for its fabrication

Main Idea

1. Describe your invention, stating the problem solved (if appropriate), and indicating the advantages of using the invention.
The invention is the fabrication of a gate electrode comprising Re metal. The work fucnction of Re makes it compatible with current pFET requirements. As it is elemental in nature, it can withstand the high hydrogen pressures necessary to produce properly passivated interfaces without undergoing chemical changes. Its thermal stabiliy on SiO2 Al2O3 and a variety of other dielectrics makes it comptible with post processing temperatures up to 1000 C. Methods have been developed to fabricate fet's and to passivate the channel/dielectric interfaces of these fet's to better than 5e10 interface states/cm2

2. How does the invention solve the problem or achieve an advantage,(a description of "the invention", including figures inline as appropriate)?
The new pfet gate avoids the problem of poly depletion which reduces the effective capacitance of poly gate devices, and necessitates the use of a thinner dielectric than would otherwise be required. At the same time its thermal stability makes it fully compatible with satndard post processing techniques, e.g. acitvation anneals and the like.

3. If the same advantage or problem has been identified by others (inside/outside IBM), how have those others solved it and does your solution differ and why is it better?
the problem is generally known, but there are no fully satisfactory solutions extant.

4. If the invention is implemented in a product or prototype, include technical details, purpose, disclosure details to others and the date of that implementation.
N/A